

in an appendix six different schedules of science work, which will doubtless be valuable and suggestive to teachers. In fact, the report should be read by all public-school governors and teachers, pastors and masters.

### THE EGYPTIAN LAND SURVEY.<sup>1</sup>

THIS interesting volume forms a worthy termination to a piece of work of considerable interest and of immediate practical importance, the construction of the great land map of Egypt.

The fertile valley of the Nile has been a densely populated and closely cultivated tract from the earliest dawn of civilisation; so far back as 2000 B.C. methods of boundary delimitation and area computation are recorded as being in use, methods which, with modifications and improvements only at rare intervals, have lasted down to quite recent times. Seeing the intimate connection of the system of land *ténure* with the daily life of the people, we might be surprised to find that, up to ten years ago, there was in existence no general land map. It is, however, quite possible for a complex and orderly scheme of land-holding to coexist with an entire absence of maps—our own islands could be adduced as an example of this; in fact, it is not in general until required for fiscal purposes, *i.e.* for some form of land taxation, that a complete cadastre, or accurate large-scale map, is demanded.

In Egypt, when the present Survey Department was constituted in 1898, following upon a survey of State lands begun in 1892, it was found that though vast sums had been expended upon spasmodic efforts at map-making, no work of a permanent nature had been done and for all practical purposes most of the money so spent might as profitably have been thrown into the Nile. Thus, for example, during the ten years from 1878 to 1888 an elaborate cadastre of part of five provinces was made, but being based upon no system of triangulation or other accurate fixation of points, and being carried through so that no part of the work was really self-contained and complete, the whole was well-nigh valueless. In this way about 400,000*l.* was spent. If we cared to calculate the sums similarly wasted on previous abortive attempts we could doubtless exhibit a very handsome total, driving home the lesson that in map-making inaccurate and inefficient work spells, not only trouble and delay, but a large, direct waste of public money.

In 1898, however, this waste, so far as Egypt is concerned, came to an end; a standing survey department was established; the idea that the mapping of a region is a temporary business, which can be completed in a definite period and then set aside as finished—a delusion still found lingering in certain quarters—was discarded, and the whole work was started upon sound and permanent lines. The result of this wise procedure is that the administration now possesses a map of the cultivated area, upon a uniform scale of 1/2500, a possession of enormous value to the agricultural development of the country, without which it would be almost impossible equitably to collect the revenue due under the great water-supply schemes now in existence and likely to be undertaken in the future.

In general, we may fairly say that the account of a cadastral survey would not be of any appreciable interest except to the professional surveyor. In the case of Egypt, however, this limitation by no means

holds, and many portions of the present volume, especially the descriptions of the old land measures and the methods of arriving at the areas of holdings, will be found attractive to the general reader. To the surveyor this graphic summary of modern map-making in the land generally accounted the birth-place of his science cannot fail to prove enthralling. There is possibly no country where exactly the same conditions are to be found as those obtaining in the Nile valley, but there is much in this volume applicable to the survey of any closely populated, flat district. Anyone who has the planning of such work, or who is in any way concerned with its execution, owes a debt of gratitude to Capt. Lyons and his staff for the trouble they have taken to place on record the fruits of their accumulated experience.

E. H. H.

### NOTES.

DR. A. BREINL, who has worked in connection with the Liverpool School of Tropical Medicine for the past five years, has been appointed director of the newly founded School of Tropical Medicine in Western Australia.

PROF. WILHELM VALENTINER has resigned the directorship of the Astronomical Institute of the grand ducal Observatory of Heidelberg. This institution is now merged with the Astrophysical Institute, under the general direction of Prof. Max Wolf.

LIEUT.-COLONEL ALLAN CUNNINGHAM, R.E., announces the verification of a Mersenne's number (the lowest as yet unverified) to be *composite*, viz.

$$2^{71} - 1 = 228479.10334355636337793.$$

The nature of the large factor has not been determined.

THE death is announced in *Science* of Prof. S. W. Johnson, emeritus professor of agricultural chemistry in Yale University, where he held a professorship for fifty-three years. He had been a member of the National Academy of Sciences since 1866, had served as a past-president of the American Chemical Society, and was eminent for his contributions to agricultural chemistry.

THE Tuberculosis Exhibition which was held at the Art Gallery, Whitechapel, with great success (see *NATURE*, July 8, p. 48)—more than 70,000 people visiting it—has been moved to the Imperial International Exhibition (White City), Shepherd's Bush, and was opened there on Friday, August 6, by Lord Balfour of Burleigh. We understand that the organisers have already enough invitations to take the exhibition to the various districts of London and the provincial cities to keep it occupied for quite a year.

THE Cracow Academy of Sciences has awarded the Nicolas Copernic prize, amounting to 1000 crowns, to M. Jean Krassowski, of Cracow, for his treatment of the question, "A l'aide de la méthode de M. A. Schuster, examiner la question si les périodes des variations des latitudes, indiquées par MM. Chandler, Kimura, &c., sont réelles ou non." The Constantin Simon prize, of 900 crowns, for a work in the Polish language on mathematics or physics, has been adjudicated to M. Stanislas Zarembo, for his book "Exposé des premiers Principes de la Théorie des Nombres entiers."

THE British Museum (Natural History) has obtained from Mr. C. H. Sternberg a series of remains of the large dinosaurian *Trachodon*, from the Laramie Cretaceous formation of Wyoming, of which an account was pub-

<sup>1</sup> "The Cadastral Survey of Egypt, 1892-1907." By Capt. H. G. Lyons. Pp. viii+421. (Cairo: National Printing Dept., 1907.) Price 400 milliemes.

lished in our last number. They have just been placed on exhibition in the gallery of fossil reptiles in a case near the remains of *Iguanodon*, with which it is interesting to compare them. Besides portions of skulls, jaws, teeth, and limb-bones, there are also fragments of the remarkable skin-impressions which have been described by Prof. Osborn.

It may be remembered that the late Mr. Harry Barnato left by will the sum of 250,000*l.* for the purpose of founding some charity in the nature of a hospital, or kindred institution, in commemoration of his brother, Mr. Barney Barnato, and his nephew, Mr. Woolf Joel, both of whom died before him. After full and careful consideration of the merits of the many schemes put before them for the disposal of the money, the trustees have now decided upon applying it to the building and endowment of an institution for the reception of cancer patients. With the view of increasing the potentialities of the bequest, the new institution will be administered, except as regards its finance, in connection with the Middlesex Hospital, and the trustees have procured a suitable site in Nassau Street, adjoining this hospital's special cancer wards. The trustees, with Prince Francis of Teck, Lord Cheylesmore, Sir John Purcell, K.C.B., and Mr. Felix Davis, will form the committee which has been entrusted with the task of putting in train and carrying out this project.

THE Rev. F. St. John Thackeray, vicar of Mapledurham, gives in the *Spectator* of April 7 a few interesting stanzas from Tennyson's works to show the poet's appreciation of scientific truth. Tennyson and Darwin were born in the same year, and they did not meet until 1868, but many years previously the poet wrote the words, "So careful of the type she seems, So careless of the single life." Here, it is held, there is a suggestion of the principle of natural selection; and in other poems written before Darwin's work appeared there are anticipatory expressions upon the development of living organisms from simple to more complex forms "Till at last arose the man." Mr. Thackeray points out that Lord Tennyson says in his notes in the Eversley edition, "My father brought 'Evolution' into poetry. Ever since his Cambridge days he believed in it." It must not be forgotten, however, that the idea of evolution, as opposed to the doctrine of special creation, has been under discussion for quite twenty-four centuries. Greek philosophers, with their natural curiosity, considered the problem in detail; and six hundred years before the commencement of our era the idea of the marine origin of life was put forward by Thales. But recognition of the process of evolution is quite a different matter from the discovery of the cause. So far as we read Tennyson's lines we find in them no clear anticipation of Darwin's views as to variation and natural selection being the prime factors of organic evolution. Mr. Thackeray's letter shows that Tennyson was familiar with the general principle of development, but it provides little evidence that he anticipated the principle formulated by Darwin.

AN interesting piece of antiquarian work has just been completed by the Essex Field Club by means of a grant from the Essex County Council. It appears that in the time of Charles I. so much of this country had become "afforested" that the inhabitants of those districts subject to forest law found the conditions so burdensome that relief was applied for and sanctioned by the King, who authorised the restoration of the boundaries of all the forests to what they had been in the twentieth year of

the reign of James I. This Act was passed in 1640, and in compliance therewith a court of inquiry was held at Stratford in 1641 in order to fix the boundaries of the Waltham Forest, an area comprising the forests known subsequently as Hainault and Epping. The Perambulation resulting from this "inquisition" set forth very explicitly the limits accepted by the commissioners. In defining these boundaries, natural features and the main (Roman) Colchester road were adopted for the western, northern, and southern limits respectively, but on the eastern side, where no well-defined natural or artificial features existed, certain stones, named and dated, were put up. In 1894 these long-forgotten boundary stones were re-discovered and identified by Prof. Meldola, who published a paper about them in the *Essex Naturalist* in 1895. The stones had been badly treated in later times, as several had been uprooted, and were found in ditches near their original sites. Last year the matter was formally brought under the notice of the Essex County Council, which body authorised the re-erection of the stones by the club at a cost not exceeding 100*l.* The work has now been completed, and a meeting of the club and of representatives of the County Council went over the district on July 31. Out of eight stones seven have been identified with certainty, and the site of the eighth has also been marked. The stones have been set in solid concrete beds, and an appropriately inscribed tablet let into the foundation of each. The Essex Field Club is to be congratulated in having rescued from complete oblivion this chapter in the history of a district the greater part of which is rapidly becoming covered with the bricks and mortar of the modern builder. The forest in 1641 began "at the Bridge of Stratford called the Bow."

WE learn from the *Revue scientifique* that an International Congress on Radiology is to be held in Brussels in 1910.

It is stated that the Museum of Natural and Physical Science at Barcelona was destroyed during the riots in that city on July 28.

WE have received the first number of a journal published at Skagen under the title of *Fiskerhøjskolens Beretning*, and devoted to the schools which have recently been established in various parts of the country for instruction during the winter in all matters connected with fisheries.

IMITATION in monkeys forms the subject of an article by Mr. M. E. Haggerty in the August number of the *Century Magazine*. The monkeys experimented upon exhibited five phases of imitative behaviour, summarised as (1) simple arrest of attention; (2) following; (3) reaction to locality; (4) reaction to an object; and (5) exact repetition in detail of an observed action. By No. 1 is meant the watching by one monkey of the action of others, or, in other words, "looking," while No. 2, or "following," indicates a higher grade of mental action, and so on through the series.

ACCORDING to the report for 1907-8, the collections in the Transvaal Museum are increasing so rapidly that the accommodation afforded by the present building is altogether inadequate, this being notably the case with the mounted specimens of large mammals, of which a considerable number was added during the year under review. In the study collections the congestion is even worse, and as these include a great number of rare, and in certain instances unique, specimens, the urgent need of extension is evident.

THE Borough of Maidstone has issued an excellent and well-illustrated guide to the local museum and art-gallery, with a history of Chillington Manor House, in which the natural-history collections are preserved. Special attention is devoted in the museum to the local fauna, both recent and extinct, notices of various groups of which are given by local naturalists and geologists. The illustrations include photographs of the type-specimen of *Chelone benstedii*, a local Chalk chelonian now in the British Museum, and of part of the cranium of *Odontopteryx toliapica* from the London Clay of Sheppey, preserved in the Maidstone collection, the only known specimen of that remarkable bird except the type.

THE all-importance of selection to breeders and, in perhaps a somewhat smaller degree, to plant-growers (where hybridisation comes more largely into play), is universally admitted, but difficulties arise in practice when, as is generally the case, it is desired to improve more than a single characteristic of the animal or plant under experiment. As an aid in overcoming these difficulties, Messrs. Pearl and Surface, in the July number of the *American Naturalist*, suggest the adoption of a system of "selection index numbers," the idea of which is to combine in a single numerical expression the values of a series of important characteristics, all of which a breeder may be desirous of improving simultaneously. The analytical expression of this idea is discussed in the article, with illustrations drawn from maize and poultry raising, and it is thus shown that the index numbers form a valuable adjunct to the score-card in judging stock.

Two notes on the feathers of kalij pheasants (*Gennæus*) are communicated by Prof. A. Ghigi to vol. xii. of the *Rendiconto* of the Royal Academy of Sciences of the Institute of Bologna, the first of these relating to a case of mutation in *Gennæus swinhoei*, while the second is devoted to the development of the secondary sexual characters in *G. argentatus* and certain other birds. In the case of Swinhoe's kalij, certain marked variations from the normal type made their appearance in the feathers of a bird born in captivity, and as these cannot be attributed to hybridism, they are regarded as an instance of true mutation. In the second note the variations from the normal type of colouring and pattern produced in the feathers of the silver-pheasant and its hybrids by accelerated and retarded development are described and figured, and their bearing on the production of secondary sexual characters discussed.

FROM among a number of articles on natural history and geological subjects forming the second part of the fourth volume of *Aus der Natur*, we select for notice one by Prof. O. Jaekel on a new "find" of Devonian vertebrates between Cassel and Marburg, which has already yielded some very interesting remains, and is likely to produce many more in the near future. From this deposit, which is especially rich in armoured "placoderms," remains of no fewer than sixty different species of fish and fish-like vertebrates have been obtained, mostly in a wonderfully fine state of preservation, five or six of these belonging to forms previously known only by small portions of the armour. The author gives a restoration of the external form of *Coccosteus*, based on the new material, and differing very widely from the one in Dr. Smith Woodward's "Catalogue of Fossil Fishes." As now restored, the creature has four paired fins, a low but long dorsal fin, with a gap above the interval between the paired fins, and a somewhat similar ventral fin, continued along part of the long, whip-like tail, this long,

slender tail being hypothetically added from evidence supplied by Dr. Traquair. In conclusion, Dr. Jaekel remarks that the most noteworthy feature in the new deposit is the occurrence of the remains of a number of forms of placoderms in one spot, whereas in other places only a few such are found in association. It indicates, in the author's opinion, a kind of "explosive development."

WE have often been surprised at the curiously unscientific, but unfortunately very common, use of the term "ovum" by medical writers to designate a human embryo which has developed very far beyond the unicellular condition to which alone the term ought to be applied. We believe that a certain section of the medical profession is apt to question the importance of preliminary scientific education, but the short time spent by the medical student over his elementary biology would not be wasted even if it did no more than give him some idea of accurate terminology. The immediate occasion for these remarks is afforded by a paper by Maximilian Herzog in a recent number of the *American Journal of Anatomy* (vol. ix., No. 3), in which the author describes a very young human embryo, closely resembling that known as "Peters' ovum." Our information as to the early stages in the development of man is, from the nature of the case, so extremely meagre that any fresh light on the subject will be welcomed by embryologists. The embryo in question is regarded as representing the earliest stage of normal human development hitherto known, perhaps from one to two weeks after fertilisation.

THE Bulletin of the Liverpool School of Tropical Medicine, of which the first number has just been issued, contains correspondence relating to malaria and mosquito reduction at Ismailia and Helouan. At Ismailia the expense of the anti-malaria measures has averaged 18,000 francs per annum. In 1903 malaria cost the Suez Canal Company 38,200 francs; in 1908 this item dropped to 16,800 francs.

WE have received the second number of the *Eugenics Review* (i., No. 2, July), published quarterly by the Eugenics Education Society. The contents include editorial notes and reviews of books, and articles by Sir Francis Galton, Mr. John Russell, Miss A. H. P. Kirby, and others. The review cannot fail to be both interesting and instructive to all those who have the welfare of the race at heart.

NICOLLE and Adil-Bey in 1902 reported that the infective particles of cattle-plague virus would pass through the Chamberland porcelain filter "F," and their results were confirmed by Yersin. E. H. Ruediger states (*Philippine Journal of Science*, iv., 1909, No. 1, p. 37) that he was not able to verify these results, and in a second series of experiments, using four different filter candles, confirms his previous work, no filter candle having been found to allow the cattle-plague virus to pass through.

It is a usual custom in pharmacological work to state the dosage of drugs as so much per kilogram of body-weight of animal or man, the subject of experiment or treatment. Prof. Benjamin Moore points out in the *Biochemical Journal* (iv., Nos. 5, 6, and 7, July) that this method of stating dosage is inaccurate, the dose of a drug for two individuals of different size, apart from peculiar idiosyncrasies, being proportional, not to their weights, but to their *body surfaces*, in other words, to the two-thirds powers of their weights. Thus an adult of 150 lb. weight cannot be given fifteen times the dose for an infant



of 10 lb., but much more nearly a dose only six times as much. It may be that it is this principle which limits the value of some drugs. Thus atoxyl will cure trypanosome infections in mice and rats, but in cattle, horses, and man it is much less effectual. A rat of 140 grams weight can be safely given 0.02 gram of atoxyl. If the dose were proportionate to the body-weight, a man ought to be able to tolerate 10 grams, but, as a matter of fact, about 1 gram is the maximum safe dose, which is in close correspondence to the two-thirds powers of the ratio of weights (1/500).

THE progress of forestry in the University of Cambridge is briefly summarised in the second annual report of the forestry committee issued recently. It is announced that Mr. H. J. Elwes has made an offer to provide 1000l. towards the erection of a building to serve as a museum and a laboratory, where special attention would be devoted to the study of home-grown timbers. The reader in forestry, Dr. A. Henry, has taken steps to test the suitability of the western larch, *Larix occidentalis*, a native of North-west America, for planting as a forest tree in the British Isles and Europe; the canker disease of the common larch is being made the subject of systematic experimental investigation by Mr. E. R. Burdon.

HORTICULTURAL and general botanical articles form one of the leading features of the *Country Home*. The August number contains a contribution by Mr. G. C. Nuttall on plant aspects and plant names, in which, by means of a few examples and clever illustrations, the author shows the reasonableness of popular floral names; it is suggested that the subject is a suitable one for investigating during a holiday. A practical article on tomato culture is provided by Mr. F. W. G. Blyth, where again the excellent reproductions from photographs are conspicuous, and Mr. W. L. Terasse gives advice on the intensive cultivation of strawberries. The monthly calendar and special instructions for the month's work in garden and greenhouse add to the value of the publication.

OWING to loss of the paper for printing, the early numbers of the *Philippine Journal of Science* for the current year have been delayed. The first botanical number opens with a contribution, by Dr. E. B. Copeland, on the ferns of the Malay-Asiatic region. Largely in connection with the identification of specimens from the Philippines, Dr. Copeland has acquired a knowledge of the ferns of the Malay Archipelago, which has induced him to present a fern flora of this region. This first part refers to ten families, from the Ophioglossaceæ and Marattiaceæ to the Cyatheaceæ. Keys and short diagnoses are given for each family, genus, and species. The most striking innovation is the reduction of the genera *Alsophila* and *Hemitelia* to *Cyathea*. *Cyathea* thus becomes a genus of about 400 species, of which one-fourth occur in the region under consideration; *Dicksonia* and *Balanium* are retained. Under Marattiaceæ a fifth genus is provided by the author's monotypic genus *Macroglossum*, and *Kaulfussia* is lost under the synonym *Christensenia*.

MR. W. J. BEAN contributes to the current number of the *Kew Bulletin* (No. 6) a note regarding the effect of the past winter on trees and shrubs in Kew Gardens, with special reference to plants of recent introduction. It is pointed out that alternations between cold and unseasonable warmth were more potent than the actual intensity or duration of cold, and, incidentally, it is noted that plants growing in low, damp situations were killed, while

specimens situated on drier ground survived. A considerable number of recently introduced Chinese plants, including *Davidia involucrata* and *Ailanthus Vilmorinii*, came successfully through the ordeal, and the author gives a list of rhododendrons from north India that may be considered hardy. Bamboos suffered greatly, with the exception of *Arundinaria nitida* and *A. fastuosa*. Other shrubs that proved hardy are *Erica stricta*, *Cistus laurifolius*, *Genista virgata*, and *Vaccinium padifolium*.

THE Bulletin of the College of Agriculture, Tokyo Imperial University, Japan, vol. viii., 1909, No. 2, contains a paper by S. Kusano on the cytology of *Synchytrium puerariae* and *S. decipiens*, parasitic fungi belonging to the phycomycetes, with bibliography, and illustrated with several excellent plates; a description of a new species of moth belonging to the genus *Latirostrum*, by T. Miyake; and a revision of Japanese Arctianæ, insects injurious to farm crops and fruit and forest trees, by the same author, with descriptions of some new species.

A SERIES of Bulletins, Nos. 141-4, issued from the Colorado Agricultural College, deal with various phases of market-garden work. No. 142 discusses general problems such as tillage, manuring, &c., in the light of local experience, and lays stress on the conditions which must be fulfilled in Colorado if success is to be attained. Among them is the necessity for "shade" crops, i.e. for crops grown with the view of shading the ground from the sun's heat, or, in winter, of reducing the loss of heat by radiation, and thus of keeping the soil temperature more uniform. Another effect of a "shade" crop in summer is to diminish loss of water by evaporation. The other bulletins deal with special crops—grapes, cabbages, and celery.

SOME of the most important agricultural problems of Cape Colony are associated with water supply, and that this fact is recognised is abundantly proved by the number of articles devoted to it in the *Agricultural Journal* of the Colony. The Karoo is a dry region, and at the same time possesses a very rich soil; this combination is not unusual, and can be paralleled in the dry belt of British Columbia, of parts of the United States, and elsewhere. Its productiveness is limited by the water supply, and recourse is had to various methods for conserving and increasing the amount of moisture in the soil. Special methods of cultivation are found to diminish loss of water by evaporation, and dams are built to store rain-water, which can then be used for irrigation. Attention is also being directed to the effect of forests on water supply.

THE *Bulletin de la Société d'Encouragement pour l'Industrie nationale* (vol. iii., No. 3) recently published a long and interesting article by M. Hitier on agriculture in Russia. The various regions are described, and a good account is given of the black soils, the steppes, and other well-marked types of soil. Analyses are quoted showing the presence in black soils of 0.5 per cent. of nitrogen, 7 per cent. of organic matter, and distinct quantities of carbonates, along with sufficient potash and phosphates; the area covered by these wonderfully fertile soils is considerably larger than that of France. The natural conditions are eminently favourable for agricultural development, but the economic conditions, especially the collective ownership of land and the power of the Mir, are regarded as great obstacles, and the author does not consider any advance possible until these artificial hindrances are removed.

THE movements of the deeper waters of the Skagerack form the subject of an interesting paper by Dr. O. Pettersson which is published as No. 47 of the *Publications*

*de Circonstance* of the Conseil Permanent International pour l'Exploration de la Mer. Dr. Pettersson finds that in the underlying deep waters there is a tidal oscillation which can have daily, monthly and annual periods. These oscillations produce variations in the temperature and salinity of the sea at certain depths, and their investigation becomes of great commercial importance owing to their action in determining the coming and the migration of the herring shoals. The great annual oscillation of the coastal water in the Norwegian sea shows amplitudes of more than 100 m., and the corresponding expansion of the coastal waters of the surface to the westward, in the summer months, was found by Hjort and Nansen to cover an area more than 100 miles broad.

THE fourth report on earthquakes in Jamaica, by Mr. Maxwell Hall, contains a catalogue of shocks recorded since the commencement of the weather service in 1880, and some interesting particulars regarding the fracture of cables by the earthquake of January 14, 1907. The cable to Colon was broken four miles south of Bull Bay, and to the south of the break the cable was so deeply buried in mud that it parted in the attempt to raise it. A more extensive break took place at twenty miles further south, where the cable had been dragged from west to east, and the fractured ends were fully a mile apart, and further south the cable was again buried in mud and had to be abandoned. Captain Morrell, of the repairing ship *Henry Holmes*, reports that the two ends of the cable fitted together perfectly, the cable was in perfect condition, there were no signs of erosion, and the wires were broken clean as by a tremendous strain, which he considers to have been produced by a landslide from the direction of the shallow water to the deeper. Mr. Hall points out that the soundings indicate a gradient of 740 fathoms in five miles, or about 1 in 6, on the average, from the California bank, but where the great break occurred the sea-bed is apparently level or nearly so; consequently, he considers, the dragging of the cable for a mile or so to the east, and the parting of the ends to the same extent, could only have been produced by a great chasm opening in the bed of the sea to the east of the great break.

THE first part of the "Bergens Museums Aarbog" for the current year records an important discovery at Jaederen of a house of the Middle Iron age. It consisted of a single oblong room, the roof resting on beams set upright, distinct marks of which were found in the clay floor, and the interior being filled with remains of the birch-bark roofing. The fireplace was a paved depression in the centre, but fires had been made also in other parts of the apartment. The antiquities discovered were, on the whole, disappointing, consisting mainly of earthenware pots and grindstones, of which illustrations are given in the report. This discovery is notable, because this is the first house of this type which has been found in Norway; but in Sweden they are well known in Gotland, Oland, and Uppland, and they seem to have been noticed in Finland.

PROF. JUNE DOWNEY contributes an article on muscle reading to the July number of the *Psychological Review*. By muscle reading is meant that well-known communication between one person, the guide, and another, the subject, by means of involuntary movements of the guide, when his attention is riveted in a given direction. The writer contends that concentration of the guide's attention not only induces free involuntary movements, but also leads to more complex forms of "automatic" activity. For instance, although the guide's attention may be

momentarily distracted, his involuntary movements persist unaltered. Or, again, despite his concentrated attention in a given direction, his movements may have reference to a preceding test instead of to the present one. Unfortunately, the scant experimental data given in the present paper and her defects of experimental method make it difficult to accept with confidence any of the writer's interesting conclusions.

DURING a stay at the Sonnblick Observatory (3106 metres) in July, 1908, Dr. A. Wagner, of the Austrian Meteorological Office, made some interesting observations on cloud elements, the results of which are published in the *Sitzungsberichte* of the Vienna Academy for December last. The author deals with the water contents, both in the gaseous form, as shown by the hair hygrometer, and in its fluid form in drops or ice-crystals, also with the size of the drops. During thick fog the humidity was generally more than 100 per cent., and only sank below that amount when the sun became visible through the fog. The mean of the measurements of the fluid contents of the clouds was about 2 grams per cubic metre; the greatest value was 4.84 grams, and the smallest 0.12 gram. The total of the fluid and gaseous contents varied between 9.98 grams and 4.17 grams per cubic metre; the fluid contents were always less than the gaseous. Visibility was found to be inversely proportional to the fluid contents; its dependence on the size of the drops could not be determined, owing to the few measurements made of the latter. The mean diameter of the drops, determined by the optical method, was 33  $\mu$ , but only eighteen such observations were made, on three days.

THE July number of the Journal of the Röntgen Society contains a paper by Dr. G. H. Rodman on the historical collection of sixty-three Röntgen-ray tubes which has been got together by the society, and is now in the possession of the authorities of the Victoria and Albert Museum at South Kensington, and will in a short time be installed in two show-cases in the museum. The paper is well illustrated by photographs of the tubes, and will be of great use to those who are unable to pay a visit to the museum to inspect the tubes themselves.

A VALUABLE report by Dr. H. Happel on the present position of our knowledge of the properties of the monatomic gases is to be found in the *Physikalische Zeitschrift* for July 15. The author, after giving an account of the theoretical advances made by Sutherland and by Reinganum on the assumption of hard spherical molecules, refers to the older work of Maxwell and Boltzmann, based on the molecules repelling each other according to the inverse fifth power of their distance apart. He shows that the experimental work done during recent years on the viscosity, heat conduction, and diffusion of the simpler gases does not provide more than general support for any of these theories, and that there is great need of further investigation of these properties over very wide limits of temperature. The theory of the gas-liquid state and the theory of binary mixtures as stated by van der Waals have, in Dr. Happel's opinion, proved valuable weapons in the hands of those who, like Ramsay, Travers, Dewar, and Kamerlingh-Onnes, have been engaged in investigating the thermal properties of the monatomic gases and of mixtures of them.

A PAPER on refrigerating installations, with special reference to the arrangements necessary when narrow limits of temperature are required, was read by Mr. Robert Balfour at a meeting of the Institute of Marine

Engineers held at the White City on July 24. The author's references to the difficulties of dealing with beef are particularly interesting. Beef is much more difficult to keep in condition during a voyage than mutton. The temperature must never be low enough to produce solidification; such would cause the substance of the meat to burst, and on thawing the meat would have a flabby appearance, which would depreciate its value, although perfectly wholesome as food. The temperature should be maintained as nearly as possible at 29.5° F. The animals must not be excited immediately preceding slaughter, or have any sprained joints which would produce decomposition of the joint oil. The atmospheric conditions must not be thundery or sultry at the time of slaughter, or the air heavily charged with moisture, and scrupulous cleanliness must be observed throughout. Indeed, the ideal conditions for the slaughter-house should be those of the operating theatre of a modern hospital. An article in *Engineering* for July 30 states that there has not hitherto been much success in the bringing of chilled beef from Australia, but an experiment is now being made with a large consignment, and will be watched with interest.

IN the recently issued report of the proceedings of the International Committee of Weights and Measures at its meeting held in March last, the following points are of interest. Investigations made at the bureau of the committee at Sèvres have shown that when water at temperatures between 6° C. and 8° C. is saturated with air, the density of the water is diminished by about three parts in a million. Vols. xiv. and xv. of the *Travaux et Mémoires* of the committee, which are expected to be published shortly, will include the researches of M. Chappuis on the above subject, and also an account of the experiments conducted by MM. Benoît, Fabry and Perot with respect to the length of the metre in terms of wave-lengths of light. The former volume will also contain three important memoirs on the mass of a cubic decimetre of water. The committee announces the adhesion of Chili and Uruguay to the metric convention, and expresses much satisfaction with the proposal of our Colonial Office to distribute copies of the convention to all the British colonies and dependencies. The report includes two appendices by M. Guillaume. The first is a supplement to his paper entitled "Récents Progrès du Système métrique," which was presented to the general conference of weights and measures in 1907, and the second gives an account of the present state of the question of standard end-measures of length. It would appear from the latter paper that Airy's method for determining the lengths of end-bars, which had almost fallen into desuetude, has recently been employed at the International Bureau with considerable success.

THE issue of the *Chemist and Druggist* for July 31 celebrates fittingly the attainment of our contemporary's jubilee. The occasion of the annual summer issue of the magazine has been taken to publish a history of the growth of the periodical from its modest beginning in 1859 to the important technical journal it has since become. The contents of this jubilee issue remind us that the *Chemist and Druggist* has for many years given prominence to the scientific aspects of pharmacology, and has insisted consistently upon the value of a knowledge of pure science if scientific principles are to be followed successfully in technical processes. The present issue contains, in addition, an exhaustive account of the proceedings at the annual meeting of the British Pharmaceutical Conference, held at Newcastle-on-Tyne towards the end of last month.

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A LIST of the lectures arranged for the session 1909-10 in connection with the extension section of the Manchester Microscopical Society has reached us. The purpose of this section is to bring scientific knowledge, in a popular form, before societies unable to pay large fees to professional lecturers. The lectures are given gratuitously by members of the society, and all fees paid for lectures are devoted to the working expenses of the section. In addition to lectures, the honorary secretary is willing to arrange practical demonstrations in microscopy, microscopical exhibitions, and the mounting of microscopic objects, in connection with the work of natural history societies in the neighbourhood of Manchester. It is noteworthy that there are about sixty lectures from which to choose. The honorary secretary is Mr. R. Howarth, 90 George Street, Cheetham Hill, Manchester.

### OUR ASTRONOMICAL COLUMN.

OBSERVATIONS OF SATURN'S RINGS.—It will be remembered that on the occasion of the disappearance of Saturn's rings in 1907, Prof. Barnard, and other observers, found that even when the rings were at minimum visibility there still remained bright condensations on either side of the planet. These, Prof. Barnard suggested, were possibly due to the sunlight sifting through and being reflected from the particles comprising the crape ring.

Observations made during 1908 tend to confirm this hypothesis, for, when seen very obliquely, the crape ring appeared much brighter than when seen at such times that the rings are more open, thus showing that the particles are probably but sparsely disposed, and would permit of such transmission and reflection of sunlight as was suggested. The relative apparent brightnesses of the inner and outer bright rings as seen at different epochs also change, for during 1908, when the foreshortening of the rings was great, the outer ring appeared to be the brighter. Prof. Barnard suggests that if we could look normally at the surface of the rings the outer one would be relatively dark, and the crape ring, perhaps, invisible. Although careful search was made for it, Prof. Barnard was unable to detect any trace of the outer dark ring discovered at Mount Revard, and subsequently observed at Geneva and Greenwich (Monthly Notices [R.A.S.], vol. lxi., No. 8, p. 621).

THE RELATIVE ATMOSPHERIC EFFICIENCY OF TELESCOPES.—In a letter to No. 411 of the *Observatory* Mr. R. T. A. Innes directs attention to the subject of the relative efficiency of telescopes of different apertures as compared with the theoretical efficiencies. By tabulating the results obtained by Burnham, with various apertures, he shows that if the efficiency of the 36-inch Lick refractor be taken as 1.0, that of the 6-inch refractor used by Burnham is, relatively, 2.5, the efficiency per inch of aperture apparently decreasing regularly as the aperture increases.

This phenomenon is attributed by Mr. Innes to atmospheric interference; with a large instrument it is more difficult to find a night with perfect definition, and it is only on such nights that close doubles, at the limit of the observer's vision and the telescope's power, can be observed.

THE MOTION OF THE POLE.—No. 4344 of the *Astronomische Nachrichten* contains a paper by Mr. H. Kimura discussing the polar motion and the  $z$  component during the period 1890.0-1908.5. The investigation of the fourteen-months' period shows that it changed rather quickly, being 436 days in 1893, 442 days (maximum) in 1897, and 427 days in 1907. No such abrupt change of amplitude accompanied this change of period.

The new discussion is opposed to the previous theory that the annual period varies quickly while the fourteen-months' period remains nearly constant, the opposite appearing to be the case; but, as Mr. Kimura points out, the problem is a complicated one, in which many variables are inherent, and will have to wait for further observations and study before any definite conclusions are arrived at. Special attention must be given to the effect of lati-